APPLICATION FORM

OPERATIONAL RESEARCH CERTIFICATE PROGRAMME
In co-operation with the Canadian Operational Research Society

COURSE .....

Mr. .....
Mrs. ..... Surname ..... First Name .....
Miss .....

Address ..... Number & Street ..... Apt. No. ..... City ..... Zone .....
Telephone Home ..... Business .....
Company Name .....
Company Address .....
Present Position .....

FEE $ ..... Cash ☐ Personal Cheque ☐ Company Cheque ☐

OFFICE USE
Receipt No. .....

Please make cheques payable to the University of Toronto

Date ..... Signature .....

Send To:

UNIVERSITY OF TORONTO
DIVISION OF UNIVERSITY EXTENSION
CONTINUING EDUCATION PROGRAMME
84 QUEEN'S PARK
TORONTO 181, ONTARIO
(416) 928-2400

(continued)

References Weiss, L., *Statistical Decision Theory*, McGrew-Hill, 1981
Schlaiffer, R., *Analysis of Decisions under Uncertainty*, McGrew-Hill, 1969
De Groot, M., *Optimal Statistical Decisions*, McGrew-Hill, 1970
Thursdeye 7:30 p.m. – 9:30 p.m.
Room 314 Gelbreith Building

Simulation and management modeling
J. Abrams C.A. Fuller

The course presented is e basic, introductory treatment of simuletion for the non-expert in either simuletion or electronic computer usege. Students ere expected to heve e working knowledge of Grede 13 mathematics. A knowledge of celculus end elementery probebility is desireble. Some exposure to computer systeme or lenguege is expected.

Simulation of system beheviour generelly requires meny celculetions, end it le often considered thet only electronic computers cen cerry out this process efficiently. Therefore, time must be spent on besic idees which erise in computer progremming. The lenguege deelt with is GPSS. Treetment of the couree meteriel is directed more to discuselon end case studies then to lectures. The building blocks of simuletion studies which ere developed include problem definition, dete collection, choice of model, model construction, probabilistic veriebles, random number generetion, choice of output end model verificetion.

Reference IBM GPSS/360 Introductory User's Menuel
Thursdeye 7:30 p.m. – 9:30 p.m.
Room 102 Mechenicel Building

University of Toronto
Division of University Extension
Continuing Education Programme
1971-72

Operational Research Certificate Programme

In co-operation with the
Canadian Operational Research Society

OPERATIONAL RESEARCH CERTIFICATE PROGRAMME

In co-operation with the Canadian Dparational Research Society

This programme is designed to provide a familiarity with the variety of techniques usad by practitioners in the field of operational research. It will give students an adaquata background for advanced specialist studies and will give parsons in supervisory and management positions a working appreciation of techniques used in daily applications of operational research. The level of the courses is that ot advancad undergraduate and graduate university instruction. In racognition of the tavel ot achievement, those successfully completing the programme will be granted a certificate by tha Canadian Operational Research Society.

Admission

Applicants for admission to the programme:

(a) must be able to meet the general admission requirements of the University of Toronto, or

(b) must be of mature age (24) with suitable experiance and background in the fields covered by the programme.

An applicant must prove his qualifications for admission to the programme by submitting to the Division of University Extension:

(a) a copy of an official transcript from any Board of Education or University, *or*

(b) a copy of his birth certificate or driver's licenca *and* e letter from his superior on company letterhead, outlining the employee's experience in the field.

Certificate

Candidatas for the certificata:

(a) must attain a 'C' grade (60%) or better in at least 4 of the 6 courses and a pass in all of tham, and

(b) must make application to the Canadian Dperational Research Society.

Registration

Students may register by mail or in person, by completing the attached application form. Fees must be paid in advance, and cheques or money orders should be made payable to the University of Toronto.

Dates (unless otherwise indicated)

Mondays	Oct. 4—Dec. 13	Jan. 3—Mar. 6
Tuesdays	Oct. 5—Dec. 7	Jan. 4—Mar. 7
Wednesdays	Oct. 6—Dec. 8	Jan. 5—Mar. 8
Thursdays	Oct. 7—Dec. 9	Jan. 6—Mar. 9

Location

St. George Campus, University of Toronto

Fees

All fees are $95.00 for 20 sessions unless otherwise indicated. Faes are not retundable atter the second session. An administrative fee ot $10.00 is chargad tor all retunds.

COURSES

Students are advised to take 'Linear algebra and matricas' and 'Probability thaory and mathematical statistics' before commencing the othar courses.

Linear algebra and matrices A.H. Abdelmessih
This course consists of a study of: matrix notions and operations, inversion, detarminants, computational methods with matrices and determinants, systams of linear equations, vectors, and vector spacas, eigen value problems, linaar programming, linear models, the simplex method, and applications.
Registration is limitad to 50 students.
Suggested minimum preparation Undergraduate engineering mathamatics
Text Hadley, G., *Linear Algebra*, Addison-Wesley, 1964
Mondays 7:00 p.m. — 9:30 p.m.
254 Mechanical Building

Linear programming and its extensions
J. Abrams
This course is designed for engineers, operational researchers, and management scientists who wish to be able professionally to apply linaar programming and relatad techniques. Although no previous experience with mathematical programming is required, it will be helpful, as will be a familiarity with matrices and linear algebra. This course will start from fundamantals and develop and consider in detail such topics as the simplex method, the revisad-simplex, the dual-simplex, activity analysis, price relationships, simple and generalized transportation problems, allocation problems, capacitated transportation problems, flows through networks, and branch and bound techniques.
Parametric programming problems and an alementary case ot stochastic and integer programming will be treated. A brief introduction to non-linear and dynamic programming will be included. Although emphasis will be placed upon methods of setting up and solving problams, these problems will be related to specific applications and case studies in the literature.
Registration is limited to 35 students.
Text Dantzig, G.B., *Linear Programming and its Extensions*, Princeton University Press, 1965
Tuesdays 6:30 p.m. — 9:00 p.m.
Room 243 Galbraith Building

Probability theory and mathematical statistics
M.J. Posner
This coursa offars a systamatic introduction to modern probability thaory and mathematical statistics, and is intended for angineers and practitioners in operational research. It is designad to torm a rigorous background for those who desira a thorough course as a prallminary to undertaking advanced work in industrial anginaering, operational resaarch, or managemant sciance. Subjacts to be coverad include sample spacas, random variables, probability distributions, characteristic functions, sampling, thaory of estimation, regression, and elements of analysis of variance. Familiarity with algebra and the calculus is raquired.
Text Freund, J., *Mathematical Statistics*, Prentice-Hall, 1962
Wednesdays 7:00 p.m. — 9:30 p.m.
Room 243 Galbraith Building

Introduction to stochastic processes J.G. Templaton
This course is designed for engineers, operational researchers and management scientists who wish to acquire a working knowledge of the types ot probabilistic models which are currently being applied to problems of business and engineering.
The coursa will contain a brief review of probability theory, classification of probabilistic models, and a discussion of Markov Processes in discrete and continuous time and space. An introduction to non-Markov Processes will be given. Some consideration will be given to statistical inference and computer stimulation in stochastic models. Random walk and quauing models will be discussed. Applications include problams of machine replacement, reliability, inventory management, storage and maintenance.
Registration is limited to 35 students.
Suggested minimum preparation: Course 'Probability Theory and Mathematical Statistics', or an equivalent course; mathematical maturity, at the level expected of an engineering graduate. Some acquaintance with operationel research procedures is desiraole.
Text Parzen, E., *Stochastic Processes*, Holdan-Day, 1962
Reference Panico, J.A., *Queuing Theory*, Prentice-Hall, 1969
Tuesdays 6:00 p.m. — 8:30 p.m.
Room 310 Mechanical Building

Statistical decision theory A.A. Cunningham
The course is intended to provide a thorough introduction to the application of mathematical concepts and techniques to problems of dacision-making. As such, the course is of particular interest to engineers, operational resaarchers, and management scientists. Familiarity with the methods of probability and statistics, such as is acquired through an introductory course, is an essential prerequisite, as is calculus. A knowledge of linear algebra, although not assential, would also be very helpful. In any event, the course will begin with a statement and brief review ot those elements ot thesa topics to be used throughout the course.
The course will then proceed to davelop tha mathematical theory of decision making via such component concepts as utility, uncertainty, criteria of choica, experiment and information, etc. Emphasis will be placed throughout the course on practical considerations ot implamenting the thaory and on computational schemes. Specific applications will be discussed in the araas ot medicine, marketing, quality control, production planning, and classical statistics.

(see back panel)